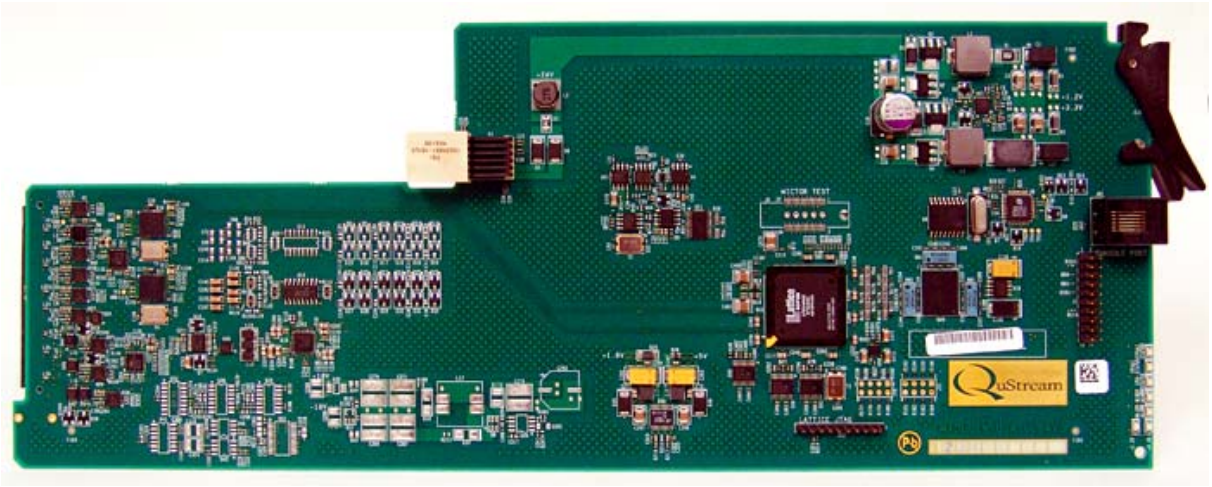
TECHNICAL MANUAL

INTEGRITY 600 SERIES

DDA617
BROADCAST-QUALITY, DOWN-CONVERTING DIGITAL VIDEO DISTRIBUTION AMPLIFIER



Publication: 81-9059-0629-0, Rev. B

July 2008

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Printed in the United States of America.

As of publication, this product had not completed FCC compliance testing.

July 2008

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Chapter 1 About This Manual

1.1 Documentation and Safety Overview

This manual provides instructions for the installation, operation, and maintenance as well as a top-level functional description of the Integrity 600 Series DDA617 Broadcast-Quality, Down-Converting Digital Distribution Amplifier built by QuStream.

It is the responsibility of all personnel involved in the installation, operation, and maintenance of the equipment to know all the applicable safety regulations for the areas they will be working in. ***Under no circumstances should any person perform any procedure or sequence in this manual if the procedural sequence will directly conflict with local Safe Practices. Local Safe Practices shall remain as the sole determining factor for performing any procedure or sequence outlined in this document.***

1.2 Warnings, Cautions, and Notes

Throughout this document, you should notice various Warnings, Cautions, and Notes. These addendum statements supply necessary information pertaining to the text or topic they address. It is imperative that audiences read and understand the statements to avoid possible loss of life, personal injury, and/or destruction/damage to the equipment. These additional statements may also provide added information that could enhance the operating characteristics of the equipment (i.e., Notes). Examples of the graphic symbol used to identify each type of statement and the nature of the statement content are shown in the following paragraphs:

1.2.1 Warning

	**Warning statements identify conditions or practices that can result in loss of life or permanent personal injury if the instructions contained in the statement are not complied with.**

1.2.2 Caution

	**Caution statements identify conditions or practices that can result in personal injury and/or damage to equipment if the instructions contained in the statement are not complied with.**

1.2.3 Note

	**Notes are for information purposes only. However, they may contain invaluable information important to the correct installation, operation, and/or maintenance of the equipment.**

Chapter 2 Introduction

2.1 DESCRIPTION

QuStream's DDA617 Broadcast-Quality, Down-Converting Digital Distribution Amplifier is a member of the Integrity 600 Series of video and audio processing products, featuring "Fortel Inside" Technology. It is a digital distribution amplifier incorporating a 3Gbs capable circuitry architecture, with an on-board, high quality Down-Converter and a 12-bit Encoder for composite analog video output that mounts in the FRM603 Chassis Frame.

Functionally, the DDA617 accepts a single input of HD-SDI (or SD-SDI) video and provides input equalization and re-clocking for standard data rates up to 1.5Gbs. Any valid data rate may be equalized, re-clocked and distributed through the HD output connectors. If an SD signal is used for the input, the re-clocked SD signal is available at the three primary output BNC connectors. The on-board down-conversion capabilities allow conversion of an input HD video signal to SD; and allow the down-converted SD signal, or an SD signal derived through mid-plane routing, to be encoded to composite analog video. If an SD signal is used for input, the signal is synchronized and available as SD output, or it may be encoded to composite analog. The following are valid signal formats that may be down-converted to SD:

- 720p @ 50Hz or 59.94Hz
- 1080i @ 50Hz or 59.94Hz
- 1035i @ 59.94Hz

Any of the down-converted HD-SDI formats may be encoded to composite analog. In addition, the following SD-SDI formats may be encoded to composite analog:

- 480i @ 59.94Hz
- 576i @ 50Hz

Seven broadcast-quality output signals are available from the DDA617 in the following formats:

- Three sources of primary, re-clocked HD video (re-clocked SD if the input signal is SD)
- One menu selectable output available as either re-clocked HD (re-clocked SD if the input signal is SD) or down-converted SD (synchronized SD if the input signal is SD)
- Three menu selectable outputs available as either down-converted SD (synchronized SD if the input signal is SD), or 12-bit encoded composite analog video

Figure 2-1 shows the DDA617 assembly with the rear panel attached to the main circuit board.

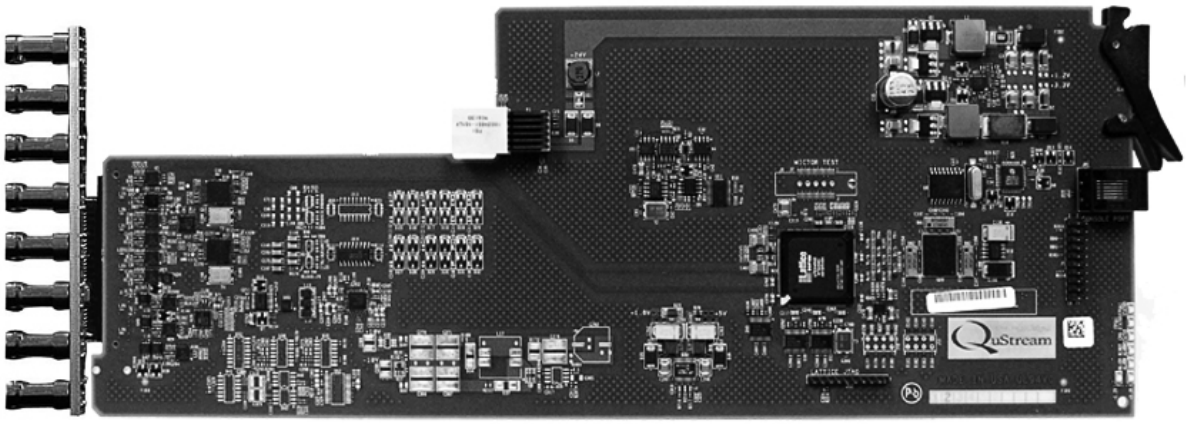


Figure 2-1 Typical DDA600 Down-Converting Digital Distribution Amplifier

2.2 MID-PLANE ROUTING

One of the unique features of the Integrity 600 Series is the mid-plane routing structure of the FRM603 "Smart Frame." This signal routing scheme allows 600 Series modules with mid-plane routing capability to share signals with modules located in adjacent card slots of the chassis frame, or with special purpose "Star Slot Capable" modules installed in frame slots 5 or 16 – the "Star Slots." All modules with mid-plane signal routing capability are equipped with a connector that interfaces the module circuitry to the mid-plane routing traces for the particular slot in which the module is installed. Star Slot Capable modules are equipped with additional connectors that interface these modules bi-directionally to every other frame slot in the chassis. These Star Slot modules can distribute signals to, and receive signals from, all other mid-plane capable cards. This capability allows a much greater degree of flexibility in planning and implementing a signal processing and distribution system than with other more conventional systems. Redundant power, sync reference and control are optionally available to every processing module through the chassis frame.

Like many of the new Integrity 600 Series processing modules, the DDA617 has mid-plane connection capability and has an input multiplexer to take advantage of the interconnections available through the FRM603 chassis frame. Figure 2-2 is a block diagram of the FRM-603 chassis frame showing the various internal routing buses. This illustration is provided here for reference only. Refer to the FRM-603 Technical Manual, QuStream Publication 81-9059-0622-0, for additional information.

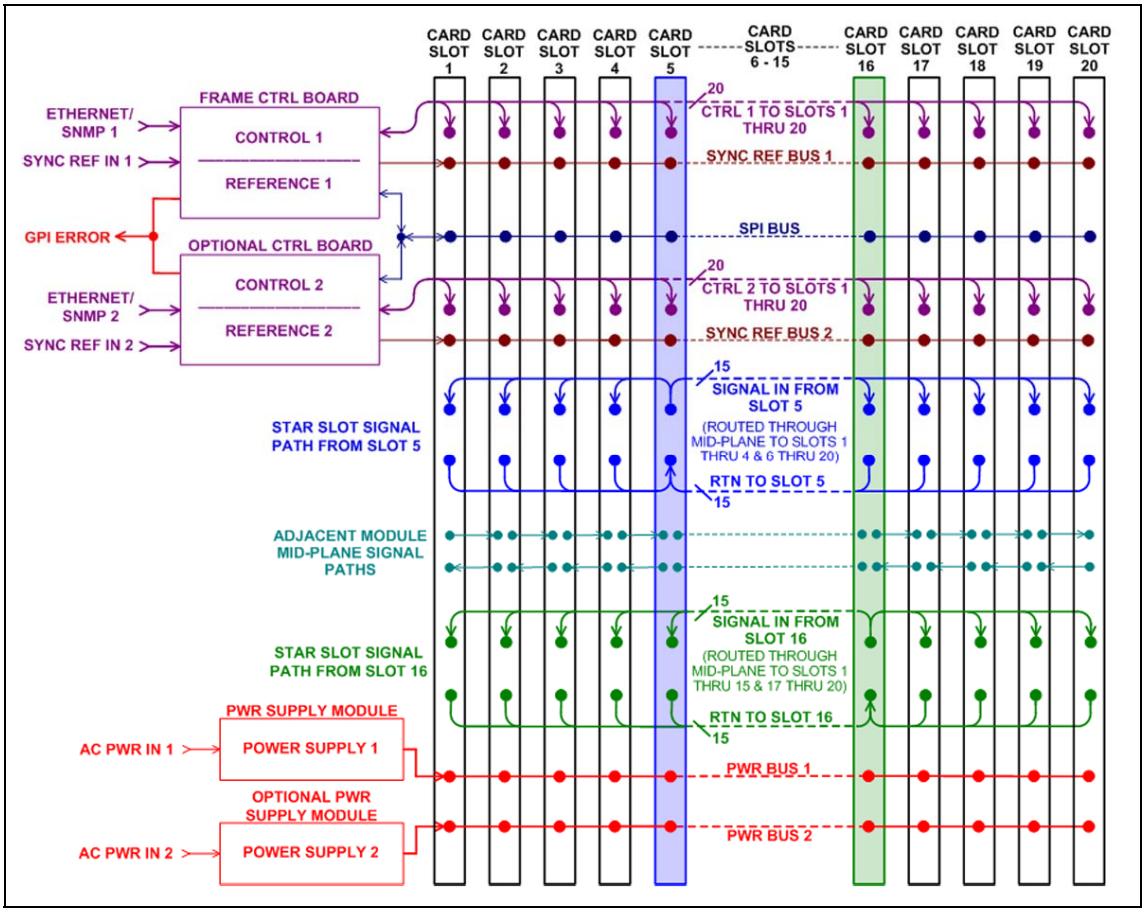


Figure 2-2 Block Diagram - FRM603 Chassis Frame

The input signal source for the DDA617 may be derived from the rear panel **IN 1** BNC connector or, by menu selection, from processing modules in adjacent card slots or from Star Slot Capable modules installed in card slots 5 or 16 over the Star Slot routing busses. All mid-plane routing is configured through an external control device such as the RCP-503 Remote Control Panel, or the SOFT603 PC based software application, via the NET 603 controller. If your frame is not equipped with a NET 603, the input signal source is factory set to order specifications, or if no input choice is specified, to the rear panel BNC connector.

Output signals from the DDA617 are available via rear panel BNC connectors, and may also be shared with processing modules in adjacent card slots or routed to Star Slot Capable modules over the Star Slot bus.

Primary Features

- Broadcast-quality SDI and analog video output signals
- HD input with equalization and re-clocking of all standard data rates up to 1.5 Gb
- Converts embedded audio from HD to SD formats
- Down-converts 720p @ 50Hz or 59.94Hz, 1080i @ 50Hz or 59.94Hz, 1035i @ 59.94Hz to SD-SDI
- Encodes 480i @ 59.94Hz or 576i @ 50Hz SD-SDI (or converted HD) to composite analog
- De-embeds audio, down-converts video to SD, then re-embeds audio
- 3 primary HD outputs
- 1 menu selectable HD or SD video output
- 12-bit composite encoder
- 3 menu selectable SD or analog output signals
- Monitoring for signal loss and carrier lock on all DAs
- Primary or down-converted output expansion through the chassis frame mid-plane using an adjacent digital DA
- Inputs interface from QuStream video routers, DRS audio routers or other systems
- Uses a single width rear connector panel and occupies one slot in the FRM603 chassis frame

Specifications

Valid Input Signal Formats:	All standard SD and HD formats from 270 Mb to 1.5 Gbs are equalized and re-clocked, other formats are equalized and passed without re-clocking
Cable length:	300 meters for 270 Mbs 100 meters at 1.5 Gbs 75 meters at 3 Gbs
Signal Level:	800 mV ±(10%)
Jitter:	0.15 UI

Chapter 3 Installation

3.1 INTERNAL ROUTING CONSIDERATIONS

When determining in which frame slot to install the DDA617 module, you should consider whether or not the internal signal routing capabilities of the frame are to be used for signal input or output sharing with the installed module. For further information on planning an Integrity 600 Series system using internal routing capability, refer to the Technical Manual for the FRM603 frame, QuStream Publication 81-9059-0622-0.

There are no restrictions on placing modules in the FRM603 frame – any module will function stand-alone in any slot. However, if you are intending to incorporate internal frame routing, adjacent module signal sharing or Star Slot routing, you should have the system pre-planned prior to module installation. QuStream recommends that you make a detailed drawing of your system and follow it when loading modules into the frame. The following guidelines will help you in your system planning, but they are not intended to be an all-inclusive, step-by-step guide.

- Make a listing of the modules you will use in your system, and determine the internal routing capability of each module. Not all 600 Series modules share the same capabilities: for example dual input distribution amplifiers are actually two independent amplifiers; one of which can receive input signals from the module *LEFT* adjacent to it, or the Star Slot *A* routing bus, and the other can receive input signals from the module *RIGHT* adjacent to it, or the Star Slot *B* routing bus.
- Not all modules are equipped for internal signal routing. If you are going to use internal routing in your layout, it would not be advisable to install modules without such capability in a Star Slot or in a frame slot you may need for signal sharing.
- Consider placement of modules you intend to share signals first. Include in your sketch which module will receive a signal from an external source, how you want signals distributed to other modules and with which module the internal routing will terminate.

3.2 DDA617 MODULE INTERNAL ROUTING CAPABILITIES

In planning a system incorporating internal routing, you must consider the internal routing capabilities of the Integrity 600 Series module(s) you are installing. Each DDA617 module can derive its input signal from either the rear panel BNC, the left adjacent module or the right adjacent module; or if the frame is equipped with a star slot capable module in either, or both, of the star slots, the input signal may be derived from a star slot capable module. Each DDA617 module can provide output signal to all internal routing options.

NOTE

When planning a system using mid-plane routing remember that the RIGHT adjacent module is always the next numerically higher slot and LEFT adjacent is always the next numerically lower slot to the one being configured. Slot numbers increase left to right from the FRONT of the frame. Therefore, when viewed from the **REAR** of the frame – the LEFT adjacent module is physically located to the RIGHT, and the RIGHT adjacent module is physically located to the LEFT of the slot you are configuring!!!!

Signal routing capabilities are listed in Table 3-1, and shown pictorially by the block diagram – Figure 4-8. All mid-plane routing is configured through an external control device via the NET 603 controller. If your system does not incorporate any Star Slot Capable modules, the mid-plane routing capability between modules is limited to adjacent slot signal sharing. If your frame is not equipped with a NET 603 controller, the input signal source is factory set as specified at time of order; or, if not specified, to the rear panel BNC connector.

Table 3-1 Internal Routing Capabilities – DDA617 Module

		Input Connectivity				Output Connectivity			
Module Type	**Frame Slots Occupied**	**Left Adjacent Module**	**Right Adjacent Module**	**Star A (Slot 5)**	**Star B (Slot 16)**	**Left Adjacent Module**	**Right Adjacent Module**	**Star A (Slot 5)**	**Star B (Slot 16)**
DDA617	1	Yes*	Yes*	Yes* – With a Star Slot Capable Module in Slot 5	Yes* – With a Star Slot Capable Module in Slot 16	Yes	Yes	Yes – With a Star Slot Capable Module in Slot 5	Yes – With a Star Slot Capable Module in Slot 16

*Only one input signal may be active to the module at any time

3.3 INSTALLATION PROCEDURE

Every Integrity 600 Series processing module consists of a rear connector panel and the main circuit card. These two items are shipped as a set, but must be installed individually into the FRM603 chassis frame. The DDA617 rear connector panel occupies one card slot in the FRM603, and may be installed in any available slot in the chassis frame. Proper installation requires that the rear connector panel be installed before the circuit board. Observe the following precautions before proceeding with installation:

CAUTION

Damage may occur to the rear connector panel or the circuit board if the installation instructions are not properly followed.

- Rear connector panel MUST be installed before the front-mounted circuit board.
- If a circuit board should occupy a chassis frame slot where a rear connector panel is to be added or changed, the circuit card MUST be removed or slid out a minimum of two inches from the front side of the chassis frame before installing the rear connector panel.

It is not necessary to remove power to the chassis frame prior to installing a processing module.

3.3.1 INSTALL REAR CONNECTOR PANEL

Install rear connector panel as follows:

1. If your processing module was shipped with the rear connector panel attached to the main circuit board, separate the two units.
2. Figure 3-1 illustrates the connector panel installation process using a single-width panel; however the procedure is identical for installing a double-width rear panel.
3. Orient the rear connector panel with the main board connector toward the lower edge of the chassis.
4. Install the panel by pressing it upward under the top lip of the chassis frame, and move the panel toward the chassis until it is flat against the chassis frame, refer to Figure 3-1.
5. Allow the bottom edge of the connector panel to drop down into its mating slot at the bottom of the lower edge of the chassis.
6. Install retention screw through connector panel to chassis frame, but **DO NOT** fully tighten the retention screw, leaving the rear panel freedom to move, until after the Main Circuit Board is installed per Paragraph 3.3.2.

CAUTION

DO NOT fully tighten the retention screw until **after** the Main Circuit Board is installed. Severe damage could occur to the main board connector if the rear panel is tightly secured prior to installing the main board.

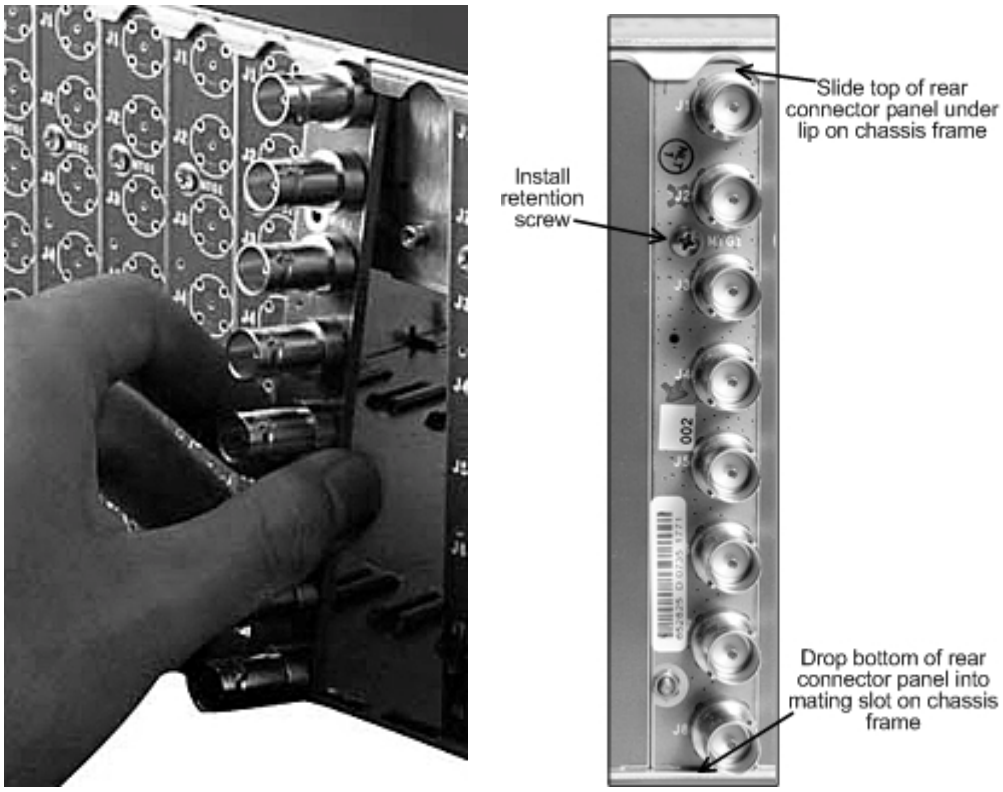


Figure 3-1 Installing Rear Connector Panel

3.3.2 INSTALL MAIN CIRCUIT BOARD

Install main circuit board as follows:

1. Open front access door on the FRM603 chassis frame.
2. Locate the empty card slot that mates to the rear connector panel installed in the previous step.
3. Align the top and bottom edges of the circuit board with the chassis card guides as shown in Figure 3-2.
4. Hold the card ejector lever out (unlocked position) as shown when inserting the board.

5. Press the board into place to ensure solid connection with the mating connectors on the mid-plane and rear connector panel.

NOTE

Do not force the card into position. If the card does not seat with gentle pressure, back it out, realign with the card guides and reinsert the card.

6. When the card is properly seated, press the card ejector lever toward the board to lock the card in position.
7. Once the main board is seated and locked, and all connectors have properly mated, secure the rear connector panel to the chassis frame by tightening the retention screw.
8. Close the chassis frame front access door.

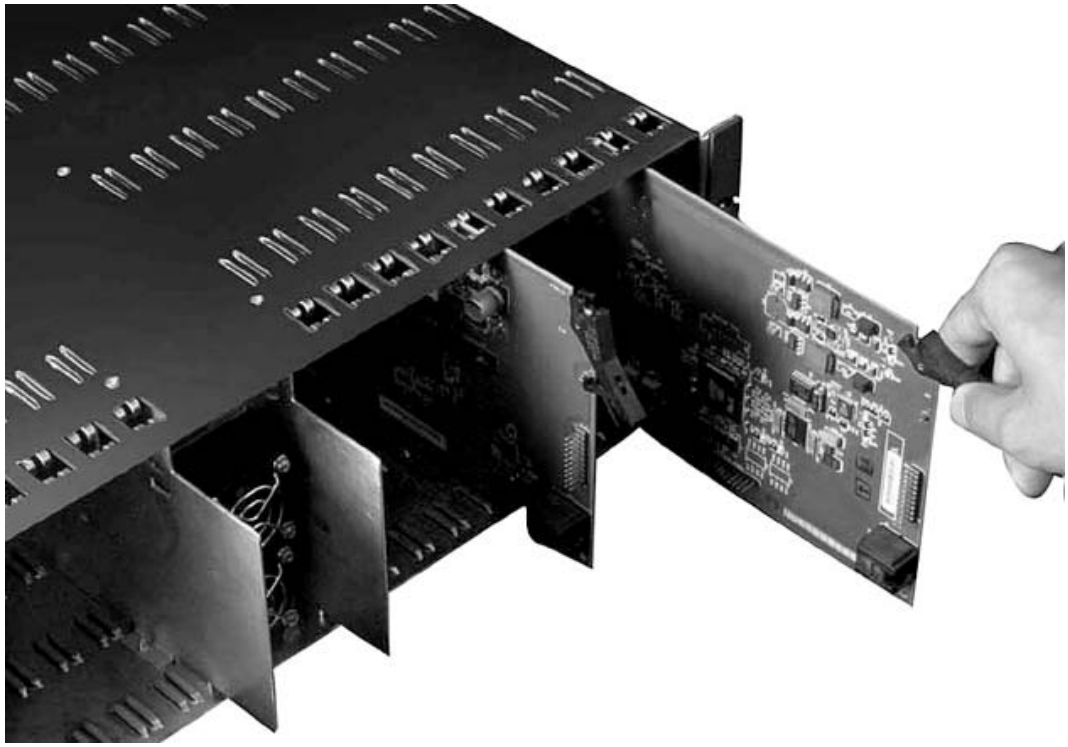


Figure 3-2 Installing Main Circuit Board

3.4 REAR PANEL SIGNAL CONNECTIONS

Input and output connections to the processing module may be made through the rear connector panel, or, in some installations, the internal routing mid-plane of the chassis frame. The DDA617 uses a single-width rear panel with 8 BNC connectors. When the rear panel connectors are used for I/O connections, the panel layout is shown in Figure 3-3 and the function of each connector is briefly discussed in the following paragraphs. When making connections to the rear panel connectors, use a good quality coaxial cable and ensure that the mating BNC connector is properly installed.

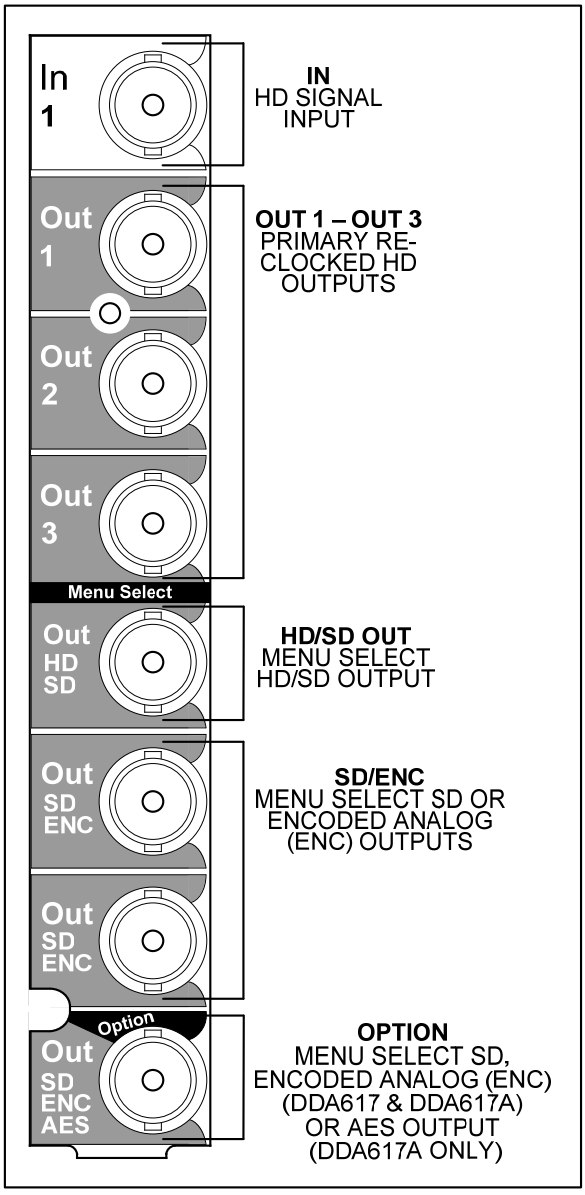


Figure 3-3 DDA617 and DDA617A - Rear Panel Connections

3.4.1 HD SIGNAL INPUT CONNECTOR

Rear panel connector **IN A** accepts an input of HD (or SD) video with embedded AES audio from an external source.

3.4.2 PRIMARY RE-CLOCKED HD OUTPUTS

Rear panel connectors **OUT 1, OUT 2** and **OUT 3** provide outputs of re-clocked HD video with embedded AES audio (re-clocked SD if the input signal is SD). These output signals are fixed and cannot be changed through menu selections.

3.4.3 MENU SELECT HD/SD OUTPUT

The output signal from this single rear panel connector, labeled **HD/SD OUT**, may be selected as either HD video with embedded AES audio (re-clocked SD if the input signal is SD) or SD video down-converted from an HD input (synchronized SD if the input signal is SD). Menu selections are made through an external control device such as the RCP-503 remote control panel, or the SOFT603 PC based software control application, via the NET 603 frame controller card.

3.4.4 MENU SELECT SD OR ANALOG (ENC) OUTPUTS

The output signal from the two rear panel connectors, labeled **SD/ENC**, and the rear panel connector labeled **Option**, may be selected as either down-converted SD video (synchronized SD video if the input signal is SD), or encoded composite analog video. Menu selections are made through an external control device.

3.5 MENU SELECTIONS

Menu selectable outputs may be configured through an external control device such as the RCP-503 remote control panel, or the SOFT603 PC based software control application, via the NET 603 frame controller card option for the FRM-603 chassis frame. If your frame is not equipped with a frame controller card, the signal outputs are configured at the factory prior to shipment of the DDA-617.

3.6 INITIAL POWER-UP

It is not necessary to remove power when installing the DDA617 module into an active chassis frame. If this is an initial installation, before applying power for the first time, please take time to go back and verify the following:

- Check for electrically sound connections, proper connector placement and possible wiring errors.
- Ensure that the chassis frame has a connection to a source of in-house sync, if required for the application.
- Check that all 600 Series modules, rear panels, power supply and controller modules are securely installed.

There is no power switch on the frame, and it is powered-up simply by connecting the main power cord to a source of primary power. Systems with redundant power supply modules have two main power cords, each of which must be connected to a source of primary power.

When the DDA617 module is initially powered up, look at the status LEDs located along the front edge of the module and verify proper operation as discussed in Paragraph 3.7.

3.7 DDA617 STATUS LEDS

There are 7 status LEDs located along the front edge of each DDA617 module, as shown in Figure 3-4.

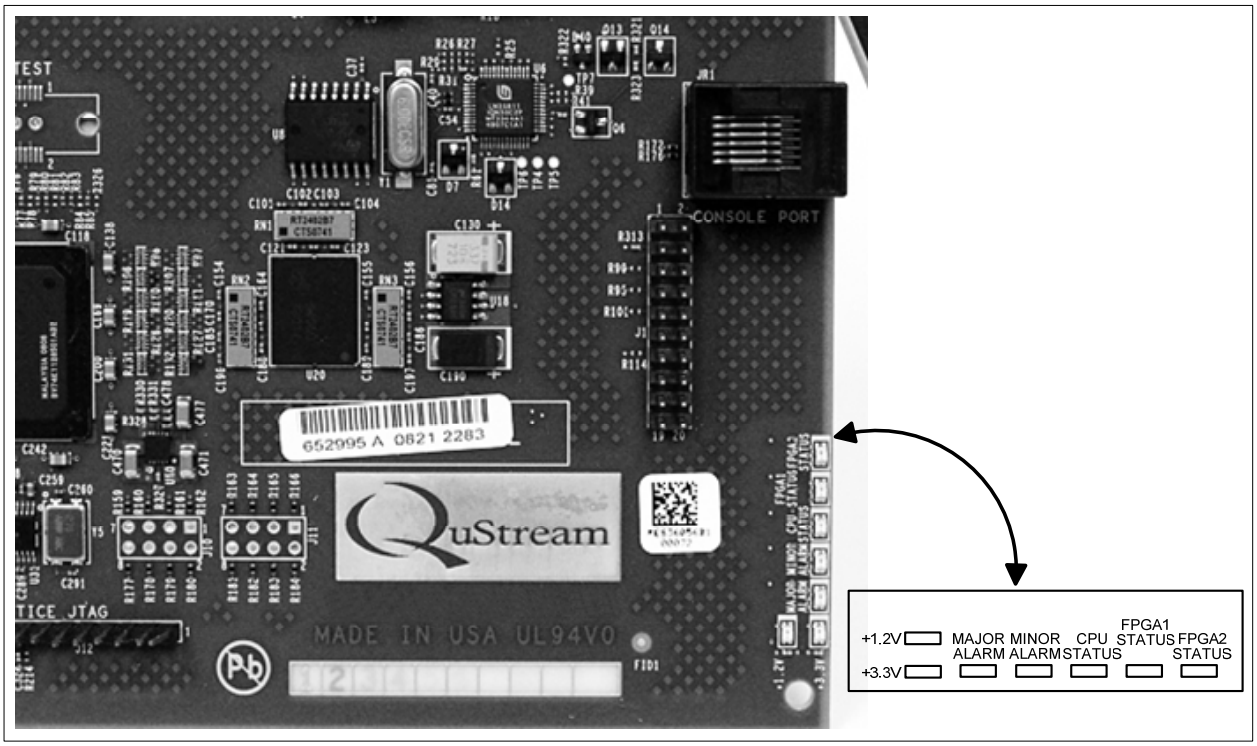


Figure 3-4 DDA617 Status LEDs

Verify that the LED indicators are showing the proper operating status of the module. The function of each LED is discussed is discussed below:

- +1.2V – GREEN – When lit, indicates the 1.2V power supply is operational
- +3.3V – GREEN – When lit, indicates the 3.3V power supply is operational
- MAJOR ALARM – RED – When lit, indicates a major alarm condition detected
- MINOR ALARM – YELLOW – When lit, indicates a minor alarm condition detected
- CPU STATUS – GREEN – When flashing, indicates the CPU is active
- FPGA1 STATUS – GREEN – When lit, indicates the presence of a valid video input signal
- FPGA2 STATUS – YELLOW – When lit, indicates incoming video is an HD-SDI signal; when NOT lit, indicates the incoming video is an SD-SDI signal

Chapter 4 Operation

4.1 OPERATION

There are no operating controls located on the DDA617 module. Input signal source and certain operating parameters of the module may be selected or modified through an external control device such as the Integrity RCP-503 remote control panel, or the SOFT603 PC based software control application, if the chassis frame is equipped with at least one NET 603 frame controller module. While most installations do contain a frame controller card, any 600 Series module will function without a controller card present in the frame; however, options from the configuration menus discussed in this chapter can not be chosen or changed in the field. The module will be factory programmed prior to shipment. Refer to the RCP-503 Technical Manual, QuStream Publication 81-9059-0636-0 for control panel operation procedures. The following paragraphs introduce the configuration options and adjustments available through each configuration menu.

4.2 CONFIGURATION MENUS

When a DDA617 module is installed in a FRM603 frame equipped with a NET603 Frame Controller card, certain configuration and operational parameters for the module may be selected through menus displayed by the external control device. The following paragraphs introduce the menus and options available through each.

4.3 MAIN MENU SCREEN

Figure 4-1 shows the Main menu display for the DDA617 module. Display and menu functions are discussed in the following paragraphs:

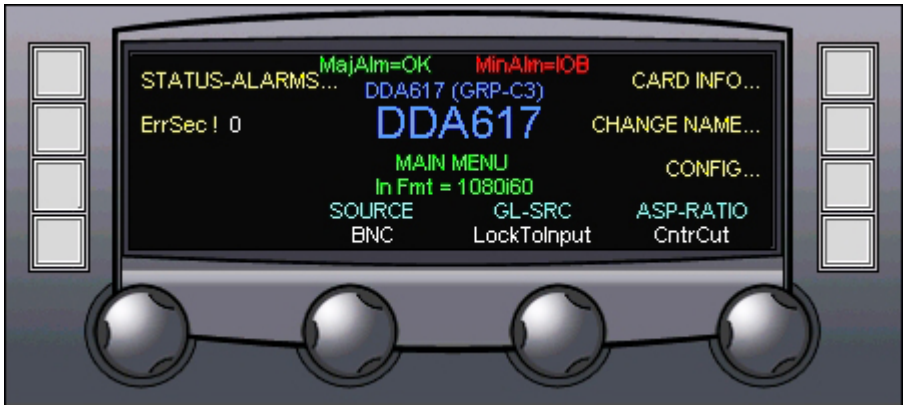


Figure 4-1 DDA617 Module Main Menu

SOURCE

The **SOURCE** display indicates the current active signal source for the DDA617 module. Desired input signal source may be selected, from the options listed below, by rotating the control knob beneath the display.

- **BNC** allows the user to select the input source for the amplifier as the signal applied to the rear panel BNC connector
- **LEFT** selects the signal source as the signal derived from the module located left-adjacent to the DDA617 module in the FRM603 frame
- **RIGHT** selects the signal source as the signal derived from the module located right-adjacent to the DDA617 module in the FRM603 frame
- **Star-A** selects the signal present on STAR BUS A (Card contained in Slot 5) as the input signal
- **Star-B** selects the signal present on STAR BUS B (Card contained in Slot 16) as the input signal

GEN-LOCK SOURCE

The gen-lock source display (**GL-SRC**) indicates the current active source of external sync reference. The reference source may be selected by rotating the control knob beneath the display. The following options are available:

- **LockToInput** – Sync reference is derived from the video input signal
- **GL-A** – Derives sync reference from an external source applied to chassis frame rear panel connector GL-A
- **GL-B** – Derives sync reference from an external source applied to chassis frame rear panel connector GL-B

ASPECT RATIO

The setting of the aspect ratio control (**ASP-RATIO**) selects the display format for the down-converted SD video signal in 4:3 aspect ratio from the following options.

- Center Cut (**CntrCut**) – Derives the SD video image from the 16:9 HD image by displaying the center portion of the HD image equivalent to 4:3 display
- Letter Box (**LetBox**) – Retains the 16:9 aspect ratio of the HD image by inserting black bars above and below the image
- Anamorphic Squeeze (**AnamorphSqz**) – Squeezes the HD 16:9 image horizontally to derive the 4:3 aspect ratio

STATUS-ALARMS

Pressing the touch-switch next to the **Status-Alarms** selection opens the Status and Alarms display screen, discussed in Paragraph 4.4.

MAJOR ALARM

The Major Alarm (**MajAlm**) display entry, located at the top of the screen, identifies alarm functions designated as major alarm notifications that are currently in the alarm active state. If a major alarm event is active, the entry is displayed in red and the function that triggered the alarm is displayed. If there is no major alarm condition, the entry is displayed in green with a status of **OK** displayed. This is a display indicator only – no configuration functions are accessible from this entry.

MINOR ALARM

The Minor Alarm (**MinAlm**) display entry, located at the top of the screen, identifies alarm functions designated as minor alarm notifications that are currently in the alarm active state. If a minor alarm event is active, the entry is displayed in red and the function that triggered the alarm is displayed. If there is no minor alarm condition, the entry is displayed in green with a status of **OK** displayed. This is a display indicator only – no configuration functions are accessible from this entry.

ERROR SECONDS

Error Seconds (**ErrSec**) is a display only entry showing how many seconds a video input error (CRC data error on the digital video packets) has been present. This display is a running tally of "error-seconds," and may be contiguous, or spaced out. When the input error condition is corrected, the display will stop incrementing the elapsed error seconds, but will continue to display the time until reset. Ideally, the error seconds count should be zero, however, there will typically be several counted errors occur during power-up, or when the cabling is changed.

INPUT FORMAT

The Input Format (**In Fmt**) display entry, located in the center area of the screen, identifies the format of the video input to the module.

CARD INFORMATION

Pressing the touch-switch next to the **CARD INFO** menu item opens the Card Info menu, discussed in Paragraph 4.6.

CHANGE NAME

Pressing the touch-switch next to the **CHANGE NAME** menu item opens the Change Name menu, discussed in Paragraph 4.7.

MODULE CONFIGURATION

Pressing the touch-switch next to the **CONFIG** menu item opens the Module Configuration menu, discussed in Paragraph 4.8.

4.4 STATUS AND ALARMS DISPLAY AND MENU SCREEN

Enter the Status and Alarms Display and Menu screen by pressing the touch-switch next to the **STATUS-ALARMS** entry on the main screen. This screen contains both display only and selectable menu entries. Figure 4-2 shows the screen for the DDA617 module. Various displays and controls available from the screen are discussed in the following paragraphs:

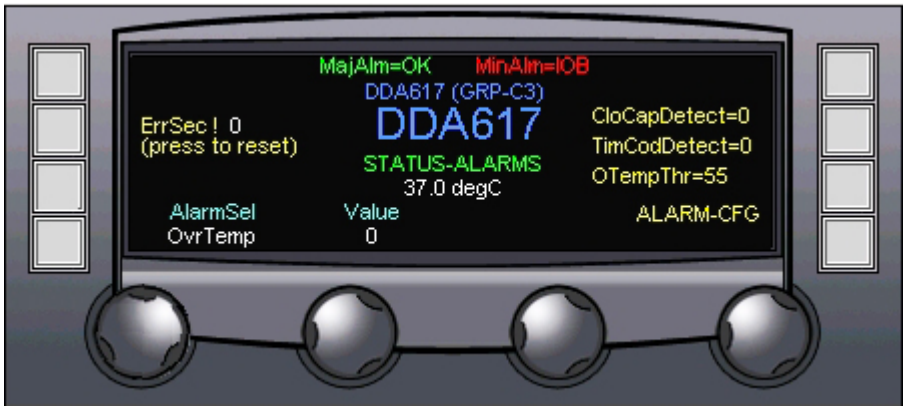


Figure 4-2 Status and Alarms Display and Menu Screen

ALARM STATUS DISPLAY

Current status of monitored alarm functions may be viewed by selecting the desired function and reading the returned alarm status value. Select the function by rotating the control knob beneath the **AlarmSel** menu entry until the function you wish to status is displayed. Alarm status is indicated with a numerical **Value** display of either zero or one. If the displayed value is zero, the function is operating within normal limits and no alarm condition is present. A displayed value of one indicates an out-of-limit condition has been detected for the function and the alarm indication is active. Following is a list of monitored functions and a brief description of each:

- Over Temperature (**OvrTemp**) – Monitors the operating temperature of the DDA617 module as set by the Over Temperature Threshold (OvrTempThresh) control
- Hardware Error (**HWErr**) – Monitors the status of the on-board FPGA and flash memory. A display of one indicates an error condition has been detected
- Sync Reference (**REF**) – Triggers an alarm condition if the source of sync reference is ever lost
- Video (**VID**) – Monitors the incoming video signal and sets an alarm if video is invalid or not present
- (**CRC**) – Triggers an alarm condition if bit errors are ever found in the CRC
- Input/Output Board (**IOB**) – Triggers an alarm condition if the module detects the IO board attached to it not the correct IOB for its functions, or if no IOB is detected
- Frame Rate Error (**FR**) – Triggers an alarm condition if an error is detected between the genlock frame rate and the video input frame rate

MAJOR ALARM

The Major Alarm (**MajAlm**) display entry, located at the top of the screen, identifies alarm functions designated as major alarm notifications that are currently in the alarm active state. If a major alarm event is active, the entry is displayed in red and the function that triggered the alarm is displayed. If there is no major alarm condition, the entry is displayed in green with a status of **OK** displayed. This is a display indicator only – no configuration functions are accessible from this entry.

MINOR ALARM

The Minor Alarm (**MinAlm**) display entry, located at the top of the screen, identifies alarm functions designated as minor alarm notifications that are currently in the alarm active state. If a minor alarm event is active, the entry is displayed in red and the function that triggered the alarm is displayed. If there is no minor alarm condition, the entry is displayed in green with a status of **OK** displayed. This is a display indicator only – no configuration functions are accessible from this entry.

ERROR SECONDS

Error Seconds (**ErrSec**) is a display only entry showing how many seconds a video input error (CRC data error on the digital video packets) has been present. This display is a running tally of "error-seconds," and may be contiguous, or spaced out. When the input error condition is corrected, the display will stop incrementing the elapsed error seconds, but will continue to display the time until reset. Ideally, the error seconds count should be zero, however, there will typically be several counted errors occur during power-up, or when the cabling is changed.

CLOSED CAPTION DETECT

The Closed Caption Detect (**CloCapDetect**) display entry, located on the right side of the screen, indicates the presence of closed captioning on the incoming video source. A displayed value of one indicates closed captioning has been detected on the incoming signal; a value of zero indicates closed captioning is not present. This is a display indicator only – no configuration functions are accessible from this entry.

TIME CODE DETECT

Time Code Detect (**TimCodDetect**) is a display entry, located on the right side of the screen, that indicates the presence of time code on the incoming video source. A displayed value of one indicates the presence of time code on the incoming signal; a value of zero indicates time code is not present. This is a display indicator only – no configuration functions are accessible from this entry.

OVER TEMPERATURE THRESHOLD

Over Temperature Threshold (**OTempThresh)** is a display entry, locate don the right side of the screen, that indicates the temperature (in degrees Celsius) at which the Over Temp alarm activates.

TEMPERATURE DISPLAY

The temperature display in the center area of the screen provides readout of the current operating temperature of the DDA617 module in degrees Celsius.

ALARM CONFIGURATION

Pressing the touch-switch next to the **ALARM-CFG** menu item allows access, through the password entry screen, to the Alarm Configuration menu, discussed in Paragraph 4.5.

4.5 ALARM CONFIGURATION MENU SCREEN

Enter the Alarm Configuration menu screen by pressing the touch-switch next to the **Alarm-Cfg** entry on the Status and Alarm Display and Menu screen. Before you can gain access to the alarm configuration screen, you will be prompted for the proper access code as shown in Figure 4-3.

Figure 4-3 Password Access Prompt Screen

Enter the access code [9][9][9] on the control panel keypad to access the Alarm Configuration screen, as shown by Figure 4-4. Entries on the menu screen and functions available through each are discussed below.

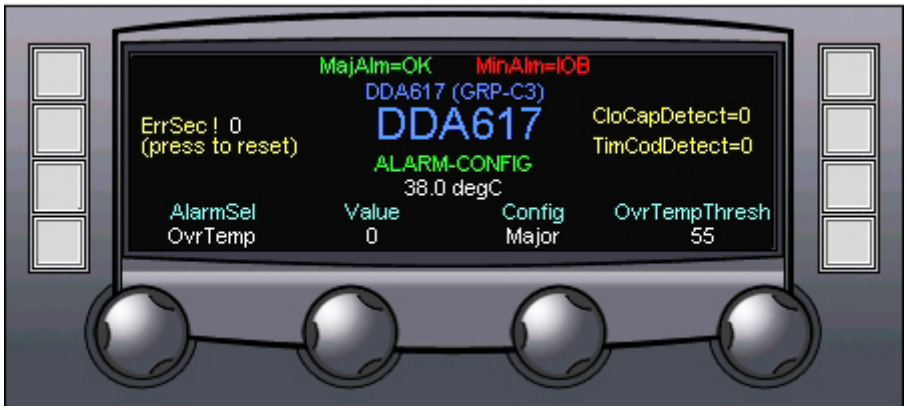


Figure 4-4 Alarm Configuration Menu Screen

ALARM SELECT

Alarm Select allows selection of the board function and parameters to associate with an alarm condition. Alarm function may be selected by rotating the control knob beneath the **AlarmSel** display. The following alarm options are available:

- Over Temperature (**OvrTemp**) – Triggers an alarm alert condition if the operating temperature of the DVA module reaches or exceeds the selected threshold temperature.
- Hardware Error (**HWErr**) – Triggers an alarm if the DVA module indicates the presence of an error condition in the hardware.
- Sync Reference (**REF**) – Triggers an alarm condition if the source of sync reference is ever lost
- Video (**VID**) – Monitors the incoming video signal and sets an alarm if video is invalid or not present
- (**CRC**) – Triggers an alarm condition if bit errors are ever found in the CRC
- Input/Output Board (**IOB**) – Triggers an alarm condition if the module detects the IO board attached to it not the correct IOB for its functions, or if no IOB is detected
- Frame Rate Error (**FR**) – Triggers an alarm condition if an error is detected between the genlock frame rate and the video input frame rate

VALUE

Value is a display only function to indicate the current status of the selected alarm function. A zero (**0**) in the display indicates that no alarm condition is present for the displayed selection, and a one (**1**) in the display indicates an active alarm condition for the selection.

CONFIGURATION

The setting of the Configuration (**Config**) selector determines which, if any, alarm is associated with the alarm selection. The following configuration options are available:

- **Off** – The displayed alarm selection is not associated with any of the available alarms.
- **Indicator** – The displayed alarm selection will be presented as an active indication when the alarm trip condition exists.
- Minor Alarm (**Minor**) - The displayed alarm selection will trigger a minor alarm indication when the alarm trip condition exists.
- Major Alarm (**Major**) - The displayed alarm selection will trigger a major alarm indication when the alarm trip condition exists.

OVER TEMPERATURE THRESHOLD

Rotating the control knob beneath the **OvrTempThresh** menu entry determines the temperature (in degrees Celsius) at which the Over Temperature alarm activates. Factory default threshold setting for the DDA617 module is 55° C.

4.6 CARD INFORMATION MENU SCREEN

Enter the Card Information menu screen by pressing the touch-switch next to the **CARD INFO** entry on the main screen. Figure 4-5 shows the Card Info menu display for the DDA617 module.

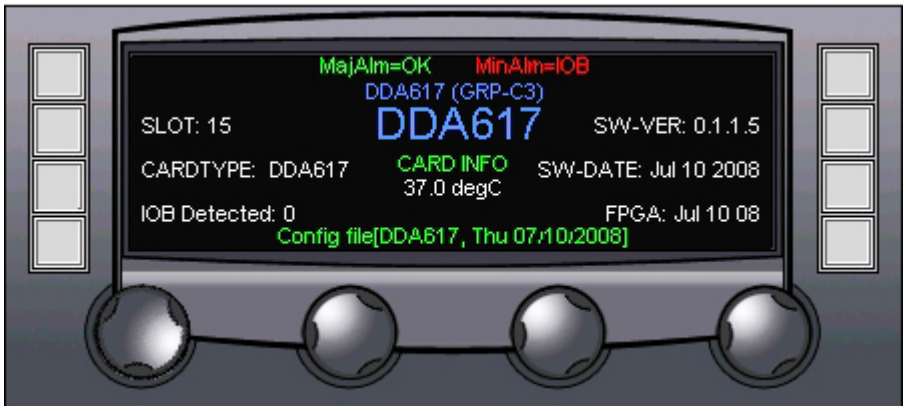


Figure 4-5 Card Information Display Screen

The card information screen displays the following operational data for the DDA617 module:

- **SLOT** – Identifies the card slot in the FRM603 frame where the DVA module is located
- **CARDTYPE** – Identifies the model number of the DVA module
- **IOB Detected** – Identifies the rear panel connector panel (input/output board) by type. For the DDA617 module, the correct rear panel type is 44. A zero, as shown in the example screen, indicates no input/output board is attached.
- Software Version (**SW-VER**) – Displays the revision number of the currently loaded software
- Software Date (**SW-DATE**) – Displays the release date of the currently loaded software
- **FPGA** – Displays the release of the firmware installed in the FPGA device
- The temperature display in the center area of the screen indicates current operating temperature of the DDA617 module in degrees Celsius

4.7 CHANGE NAME MENU SCREEN

Functions available through the Change Name menu screen allow you to enter a descriptive identification name, or alias – up to 8 characters - for the DDA617 module. Typical application of this feature would be to name the DVA module in such a way to associate it with its input signals or function, such as CAM 1, KEY VIDEO, etc. Figure 4-6 shows the Change Name menu display for the DDA617 module.

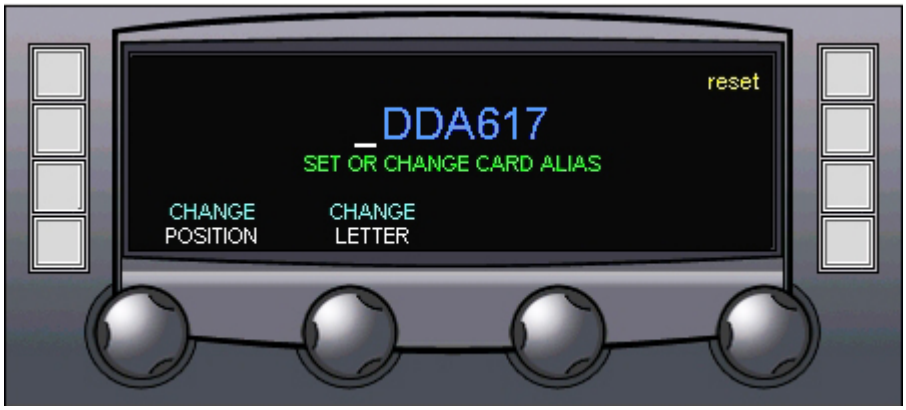


Figure 4-6 Change Name Menu Screen

CHANGE POSITION

Rotating the **CHANGE POSITION** control moves the cursor to the desired character position to enter or change.

CHANGE LETTER

Rotating the **CHANGE LETTER** control scrolls through all alphanumeric display characters - letters, numbers and punctuation marks are available. Once the desired character is displayed in the cursor position, simply move the cursor to the next position.

RESET

Pressing the touch-switch next to the **reset** menu entry sets the name display to the default card alias.

4.8 MODULE CONFIGURATION MENU SCREEN

Enter the Module Configuration menu screen by pressing the touch-switch next to the **CONFIG** entry on the Main screen. Before you can gain access to the module configuration screen, you will be prompted for the proper access code as shown in Figure 4-7.

Figure 4-7 Password Access Prompt Screen

Enter the access code [9][9][9] on the control panel keypad to access the Module Configuration screen, as shown by Figure 4-8. Entries on the menu screen and functions available through each are discussed below.

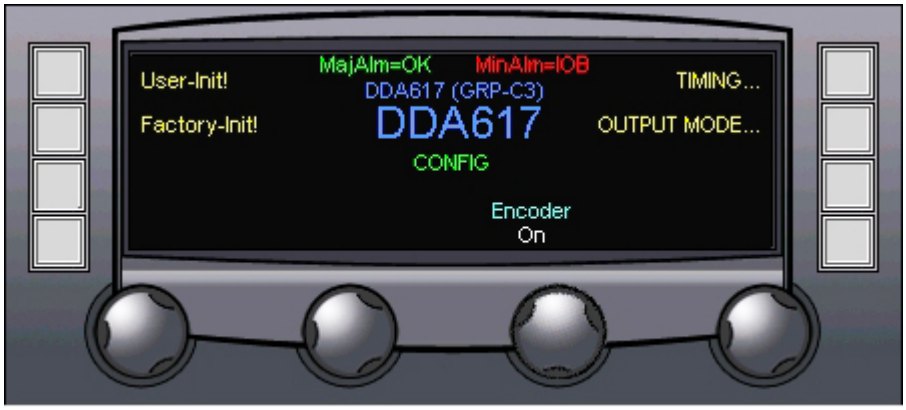


Figure 4-8 Module Configuration Menu Screen

USER INITIALIZATION
Pressing the touch-switch next to the **User-Init!** Menu entry restores all user selectable controls to factory default settings.

FACTORY INITIALIZATION
Pressing the touch-switch next to the **Factory-Init!** Menu entry restores the DDA617 module to factory default settings.

ENCODER
The **Encoder** display indicates the current active mode of the analog encoder circuitry. The encoder operating mode may be selected by rotating the control knob beneath the display. The following options are available:

- **Off** – Analog encoder circuitry is not active.
- **On** – Analog encoder circuitry is operational, providing a down-converted analog video output from the HD input signal.
- **Bars** – Analog encoder circuitry is operational, providing an output of on-board generated reference

TIMING
Pressing the touch-switch next to the **TIMING** menu item brings up the Timing Configuration menu, discussed in Paragraph 4.8.1.

OUTPUT MODE

Pressing the touch-switch next to the **OUTPUT MODE** menu item brings up the Output Mode Configuration menu, discussed in Paragraph 4.8.2.

4.8.1 TIMING CONFIGURATION MENU

Pressing the touch-switch next to the **TIMING** menu item brings up the Timing Configuration menu, shown in Figure 4-9. Control options on this menu allow varying the phase relationship between the incoming video signal and the out-going converted signal.

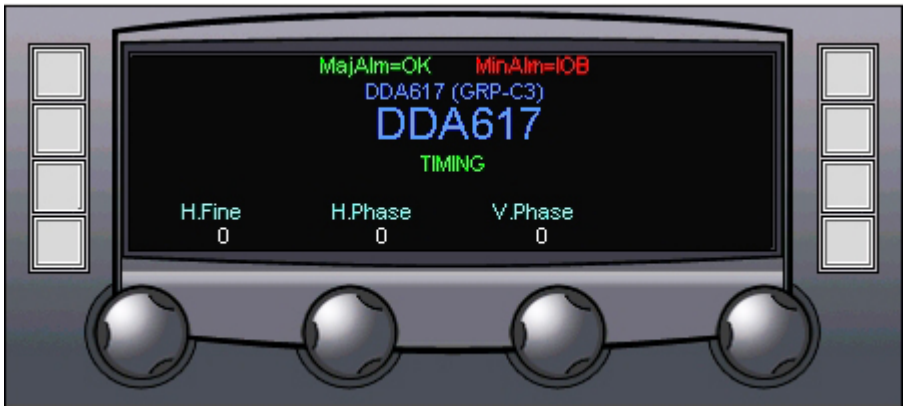


Figure 4-9 Timing Configuration Menu Screen

- Horizontal Phase (**H.Phase**) – Rotating this control selects the horizontal phase relationship; the value selected determines the amount of phase variance by the number of clock pulses in the video line.

- Vertical Phase (**V.Phase**) – Rotating this control selects the vertical phase relationship; the value selected determines the amount of phase variance by the number of video lines.

- Horizontal Fine (**H.Fine**) – This control is a fine adjustment for the horizontal phase variance, and allows timing adjustment between input and output signals.

4.8.2 OUTPUT MODE CONFIGURATION MENU

Pressing the touch-switch next to the **OUTPUT MODE** menu item brings up the Output Mode Configuration menu as shown in Figure 4-10. From this menu screen you can assign output signal types to the BNC signal outputs denoted as menu selectable.

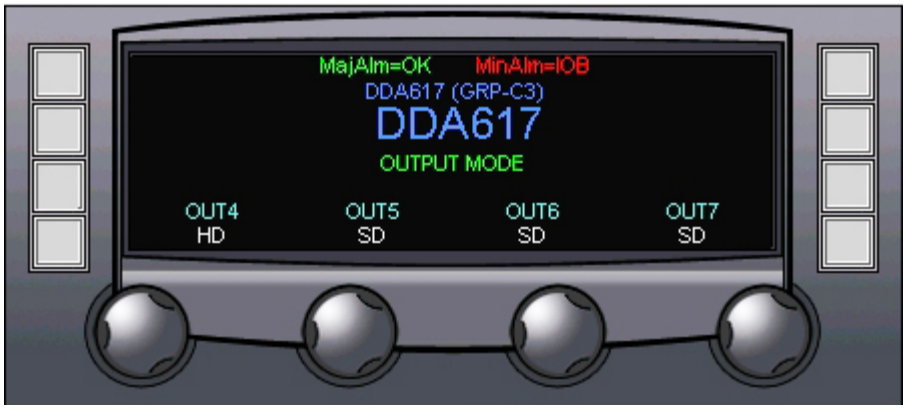


Figure 4-10 Output Mode Menu Screen

OUT4 – Selects the source for the output signal present at the HD/SD OUT BNC connector. Available choices are **HD** for high-def output and **SD** for standard definition output.

OUT5 and OUT6 – These controls select the source for the output signal present at the two SD/ENC BNC connectors. Available choices are **SD** for standard definition SDI digital video output and analog (**Anlg**) for an output of composite analog video from the on-board encoder.

OUT7 – Selects the source for the output signal present at the OPTION BNC connector. Available choices are **SD** for standard definition SDI digital video output, analog (**Anlg**) for an output of composite analog video from the on-board encoder.

4.9 FUNCTIONAL DESCRIPTION

A functional block diagram of the DDA617 module is shown in Figure 4-11.

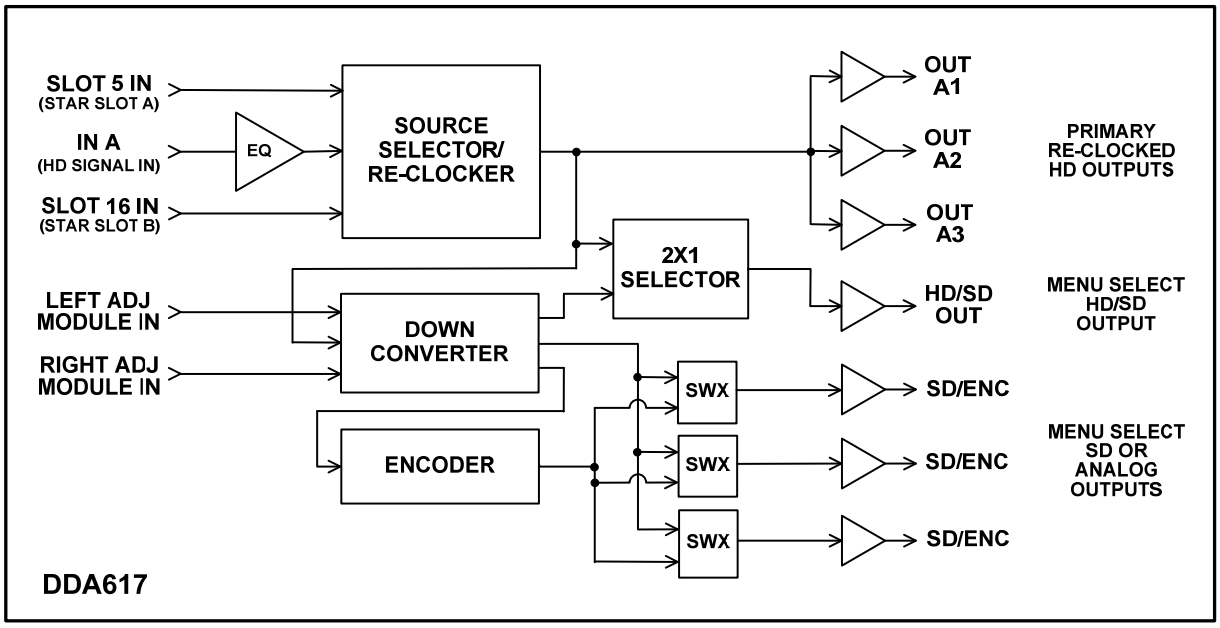


Figure 4-11 Block Diagram - DDA617 Down-Converting Digital Distribution Amplifier

Input HD video enters the module through rear panel connector **IN A,** or it may be derived from the output of a Star Slot capable module installed in either card slot 5 or 16 via the Star Slot bus. Signals entering through the rear panel BNC are equalized prior to the input multiplexer stage. Video from the star slot buses, along with the output of the video equalizer stage are present at three inputs of the source selector and re-clocker stages (Source Selector/Re-Clocker). Under command of the frame controller card, the multiplexer selects and routes one of the three input signals to the re-clocker circuitry.

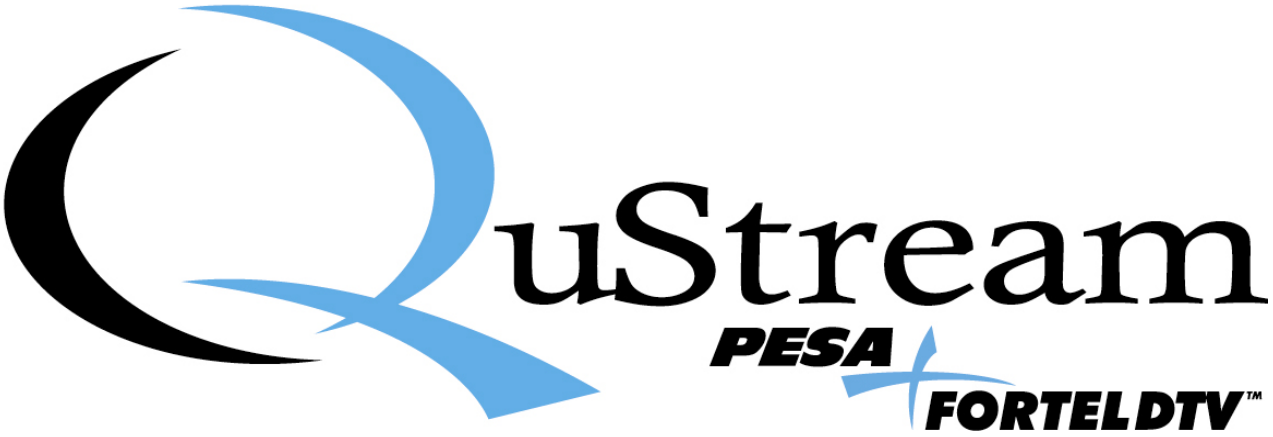
The selected and re-clocked HD video source is passed to three output drivers which supply the signal to the three primary HD signal outputs from the card: **OUT A1** thru **OUT A3**. Signal from the re-clocker is also routed to a 2X1 selector device and the SD down-converter stage.

Re-clocked HD video from the on-board multiplexer is presented as one of three inputs to the SD down-converter stage. The other two inputs are signals which may be derived from processing modules installed in FRM-603 card slots adjacent on the right and on the left of the DDA-617. On command from the frame controller, any one of the three signals may be selected as the active input to the down-converter. The selected input signal is converted to an SD video signal with embedded AES audio, and the down-converted SD signal is routed as the second input to a 2X1 selector device, to a composite analog video encoder stage and to one input of each of three switch (SWX) devices.

The 2X1 selector device, under command of the frame controller, selects as its output the HD signal from the on board re-clocker or the SD signal from the down-converter. Through this device, the user may choose a source of HD or SD video as the output present at the rear panel **HD/SD OUT** connector. Note that in order to select the desired output signal, the FRM-603 chassis must be equipped with a NET 603 frame controller.

Three FET switch devices receive an input from the SD down-converter stage and a second input from the composite analog encoder device. These devices, on command of the frame controller, select either the SD or composite video signal as the output present at their respective rear panel connectors labeled **SD/ENC**.

Note from Figure 4-11 that the input signal selected by the source selector/re-clocker stage is always available at the three primary re-clocked HD outputs, regardless of which input signal is selected by the down-converter stage. Therefore it is possible to select the signal from one of the adjacent modules for SD down-conversion and thereby configure the HD and SD outputs with different input sources. This capability adds tremendous flexibility in planning a DA system.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